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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XE988

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Dock Replacement Project in Unalaska, Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS has received a request from the City of Unalaska (COU), for authorization to take marine mammals incidental to construction activities as part of a dock expansion project at the existing Unalaska Marine Center (UMC) Dock in Unalaska, Alaska. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to the COU to incidentally take marine mammals, by Level B Harassment only, during the specified activity.

DATES: Comments and information must be received no later than [*insert date 30 calendar days after date of publication in the FEDERAL REGISTER*].

ADDRESSES: Comments on the COU's IHA application (application) should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service. Physical comments should be

sent to 1315 East-West Highway, Silver Spring, MD 20910 and electronic comments should be sent to *ITP.Fiorentino@noaa.gov*.

Instructions: Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. Comments received electronically, including all attachments, must not exceed a 25-megabyte file size. Attachments to electronic comments will be accepted in Microsoft Word or Excel or Adobe PDF file formats only. All comments received are a part of the public record and will generally be posted for public viewing on the Internet at *www.nmfs.noaa.gov/pr/permits/incidental/construction.htm* without change. All personal identifying information (*e.g.*, name, address), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible.

FOR FURTHER INFORMATION CONTACT: John Fiorentino, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Availability

An electronic copy of the COA's application and supporting documents, as well as a list of the references cited in this document, may be obtained by visiting the Internet at: *http://www.nmfs.noaa.gov/pr/permits/incidental/construction.htm*. In case of problems accessing these documents, please call the contact listed under **FOR FURTHER INFORMATION CONTACT**.

National Environmental Policy Act (NEPA)

NMFS is preparing an Environmental Assessment (EA) for the proposed issuance of an IHA, pursuant to NEPA, to determine whether or not this proposed activity may have significant direct, indirect and cumulative effects on the human environment. This analysis will be completed prior to the issuance or denial of this proposed IHA. We will review all comments submitted in response to this notice as we complete the NEPA process, prior to a final decision on the incidental take authorization request. The EA will be posted at *http://www.nmfs.noaa.gov/pr/permits/incidental/construction.htm* when it is finalized.

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce to allow, upon request by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified area, the incidental, but not intentional, taking of small numbers of marine mammals, providing that certain findings are made and the necessary prescriptions are established.

The incidental taking of small numbers of marine mammals may be allowed only if NMFS (through authority delegated by the Secretary) finds that the total taking by the specified activity during the specified time period will (i) have a negligible impact on the species or stock(s) and (ii) not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). Further, the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such taking must be set forth.

The allowance of such incidental taking under section 101(a)(5)(A), by harassment, serious injury, death, or a combination thereof, requires that regulations be established. Subsequently, a Letter of Authorization may be issued pursuant to the prescriptions established in such regulations, providing that the level of taking will be consistent with the findings made for the total taking allowable under the specific regulations. Under section 101(a)(5)(D), NMFS may authorize such incidental taking by harassment only, for periods of not more than one year, pursuant to requirements and conditions contained within an IHA. The establishment of these prescriptions requires notice and opportunity for public comment.

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as: "…any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment)."

Summary of Request

On March 22, 2016, we received a request from the COU for authorization to take marine mammals incidental to pile driving and pile removal associated with construction

activities that would expand the existing UMC Dock in Dutch Harbor in the City of Unalaska, on Amaknak Island, Alaska. The COU submitted a revised version of the request on July 30, 2016, which was deemed adequate and complete. In August 2016, NMFS released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (the Guidance, available at *http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*) which provides technical guidance for assessing the effects of anthropogenic sound on the hearing of marine mammal species under the jurisdiction of NMFS. The Guidance establishes new thresholds for predicting auditory injury, which equates to Level A harassment under the MMPA. The COA was able to update relevant portions of their application to incorporate re-calculated Level A harassment zones for vibratory and impact pile driving activities based on the updated acoustic thresholds described in the Guidance. The results of those calculations (*i.e.*, revised distances to Level A harassment thresholds) were provided to NMFS by the COU in September 2016 and have been included in this proposed IHA.

The COU proposes to demolish portions of the existing UMC dock and install a new dock between March 1, 2017 and November 1, 2017. The use of both vibratory and impact pile driving during pile removal and installation is expected to produce underwater sound at levels that have the potential to result in behavioral harassment of marine mammals. Species with the expected potential to be present during all or a portion of the in-water work window include Steller sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*), humpback whale (*Megaptera novaeangliae*), and killer whale (*Orcinus orca*).

Description of the Specified Activity

Overview

In order to meet the increasing needs of the international shipping industry and increase vessel berthing capacity, a substantial upgrade of aging UMC facilities is necessary. The proposed project will replace the existing pile supported docks located at UMC Dock Positions III and IV with a modern high-capacity sheet pile bulkhead dock that extends from the existing bulkhead dock at Position V to the U.S. Coast Guard (USCG) Dock.

COU port operations saw numerous factory trawler offloads occurring at Dock Positions III and IV in 2013. These operations require more length at the face of the dock and greater uplands area than is available with the current infrastructure. The existing pile-supported docks are aging structures in shallower water that no longer meet the needs of the Port and require increasing levels of maintenance and monitoring costs. Both docks are also severely constrained by the limited uplands area available for offloading and loading operations.

Dock Position III is a timber pile-supported dock with approximately 160 feet of dock face that was constructed in the 1960's by the U.S. Army Corps of Engineers (USACE). This dock has been used for the Alaska Marine Highway System, vessel moorage, and factory trawler offloads. However, use of this structure is severely limited due to the low load-carrying capacity of the dock. The bullrails, deck surface, and bollards have deteriorated with age and the entire structure is in need of replacement or extensive renovations.

Dock Position IV is a steel-pile-supported, concrete deck structure with an approximate length of 200 feet that was constructed in the 1980s by the State of Alaska. Similar to Dock Position III, use of this dock is limited due to the low load capacity of the structure. Erosion has damaged an abutment underneath the dock, which is very difficult to repair and has the potential for further damage to adjacent portions of the dock.

The dock face of Dock Positions III and IV does not align with the larger sections of the UMC facility, significantly limiting overall usable moorage space. The proposed project aligns the new dock structures with the adjacent facilities, eliminates two angle breaks, provides substantially more usable moorage, and provides much deeper water at the dock face. The sheet pile dock will encompass the area between Dock Position V and the adjacent USCG Dock, providing maximum use of the available berthing area and upland storage space. The new dock alignment will allow larger, deeper vessels as well as simultaneous use of the other UMC facilities.

Dates and Duration

In-water and over-water construction of Phase 1 (all sheet pile installation, all in-water pipe pile installation, most upland pipe pile installation, and fill placement) is planned to occur between approximately March 1, 2017 and November 1, 2017. Phase 2 is planned to occur between approximately May 1, 2018 and October 1, 2018. Some of the upland pipe pile for utilities may be driven in upland fill away from the dock face during Phase 2. The COU proposes to use the following general construction sequence, subject to adjustment by the construction contractor's means and methods:

Construction Phase 1 (2017):

- Mobilization of equipment and demolition of the existing dock Positions III and IV and removal of any existing riprap/obstructions (March – May 2017).
- Development of the quarry for materials.
- Installation (and later removal) of temporary support piles for contractor's template structures and barge support.
- Installation of the new sheet pile bulkhead dock. This includes driving sheet piles, placing fill within the cell to grade, and compaction of fill
- Installation of fender and platform support piles in the water adjacent to the dock and miscellaneous support piles within the completed sheet pile cells.
- Installation of pre-assembled fender systems (energy absorbers, sleeve piles, steel framing, and fender panels).
- Installation of the crane support piles
- Installation of temporary utilities and gravel surface to provide functional dock capability for the 2017/2018 season.

Construction Phase 2 (2018):

- Installation of concrete grade beam for crane rails, utility vaults, and dock surfacing.
- Installation of electrical, sewer, fuel, water, and storm drainage utilities.

Pile removal and pile driving is expected to occur between March 1 and November 1, 2017. In the summer months (April – September), 12-hour workdays in extended daylight will likely be used. In winter months (October – March), shorter 8-hour to 10-hour workdays in available daylight will likely be achievable. Work windows

may be extended or shortened if or when electrical lighting is used. The daily construction window for pile driving or removal will begin no sooner than 30 minutes after sunrise to allow for initial marine mammal monitoring to take place, and will end 30 minutes before sunset to allow for pre-activity monitoring. It is assumed that sound associated with the pile driving and removal activities will be put into the water approximately 50 percent of the total estimated project duration of 245 days (2,940 hours for 12-hour workdays). The remaining 50 percent of the project duration will be spent on activities that provide distinct periods without noise from pile driving or drilling such as installing templates and braces, moving equipment, threading sheet piles, pulling piles (without vibration), etc. During this time, a much smaller area will be monitored to ensure that animals are not injured by equipment or materials.

Specific Geographic Region

The UMC Dock is located in Dutch Harbor in the City of Unalaska, on Amaknak Island, Alaska (see Figure 5 of the application). Dutch Harbor is separated from the adjacent Iliuliuk Bay by a spit. The dock is located in Section 35, Township 72 South, Range 118 West, of the Seward Meridian. Tidelands in this vicinity are owned by the COU. Some of the adjacent uplands are owned by the COU and some are leased by the COU from Ounalashka Corporation. Adjacent infrastructure includes Ballyhoo Road and the Latitude 54 Building in which the COU Department of Ports and Harbors offices and facilities are currently housed. Neighboring docks include the USCG Dock and the existing UMC OCSP dock positions. Other marine facilities within Dutch Harbor include Delta Western Fuel, the Resolve-Magone Dock, North Pacific Fuel, the Kloosterboer

Dock, and the COU's Light Cargo Dock and Spit Dock facilities, as shown in Figure 5 of the application. APL Limited is located within Iliuliuk Bay, and the entrance channel to Iliuliuk Harbor is south of Dutch Harbor.

Detailed Description of Activities

The COU proposes to install an OPEN CELL SHEET PILE™ (OCSP) dock at UMC Dock Position III and IV, replacing the existing pile-supported structure and providing a smooth transition between the UMC facility and the USCG dock. The OCSP dock will be constructed of PS31 flat sheet piles (web thickness of 0.5 inches and width between interlocks of 19.69 inches). In order to replace the existing timber pile-supported dock, the dock construction would include installation of the following:

- Approximately forty (40) 30-inch diameter steel fender and transition platform support piles;
- Approximately thirty (30) 30-inch diameter miscellaneous steel support piles
- Approximately one hundred fifty (150) 30-inch diameter steel crane rail support piles (approximately 25 of which are above the high tide line (HTL));
- Approximately two hundred (150) 18-inch steel piles (H or round) used for temporary support of the sheet pile during construction (to be removed prior to completion);
- Approximately 1,800 PS31 flat sheet piles (approximately 100 of which are above the high tide line (HTL)); and
- Placement of approximately 110,000 cubic yards of clean fill.

The anticipated project quantities are shown in Table 1.

Concurrent with the dock construction, a material source will be developed in the hillside adjacent to Dock Position VII. The quarry will provide material for dock fill and other future projects, and the cleared area will be used for COU port offices and associated parking after the quarry is completed. The quarry will be developed through blasting benches in the rock face, with each bench being approximately 25 feet high, with the total height being approximately 125 feet. Quarry materials will be transported the short distance to the adjacent project site using heavy equipment.

Table 1. Total project quantities.

Item	Size and Type, Location	Below Mean High Water (MHW) (El. = 3.4)	Below High Tide Line (HTL) (El. = 4.7)	Total
Surface Area of Dock (Acres)	-	2.1	2.3	**3.1**
Surface Area of Water Filled (Acres)	-	2.1	2.8	**2.8**
Gravel Fill (Cubic Yards)	Clean Fill; Within dock	74,000	80,000	**110,000**
Piles to be Removed (Each)	Steel	195	195	**195**
	Timber	55	55	**55**
Estimated Temporary Piles (Each)	18” Steel Pile; Within dock	150	150	**150**
Steel Piles - Fender and Platform Support (Each)	30” Steel; In front of bulkhead	40	40	**40**
Miscellaneous Support Piles (Each)	30” Steel; Within dock	30	30	**30**
Crane Rail Support Piles (Each)	30” Steel; Within dock	125	125	**150**
Proposed Sheet Piles (Each)	PS31 Sheet Pile; Dock face	1,400	1,700	**1,800**

The existing structure will be demolished by removing the concrete deck, steel superstructure, and attached appurtenances and structures and then extracting the existing steel support piles with a vibratory hammer. Sheet pile will also be installed with a vibratory hammer. Pile driving may occur from shore or from a stationary barge platform, depending on the Contractor's selected methods. After cells are completely enclosed, they will be incrementally filled with clean material using bulldozers and wheel loaders. Fill will be placed primarily from shore, but some may be placed from the barge if needed. Fill will be compacted using vibratory compaction methods, described below. After all the sheet piles are installed and the cells are filled and compacted, fender piles, crane rail piles, mooring cleats, concrete surfacing, and other appurtenances will be installed.

As described, the project requires the removal and installation of various types and sizes of piles with the use of a vibratory hammer and impact hammer. These activities have the potential to result in Level B harassment (behavioral disruption) only, as a monitoring plan will be implemented to reduce the potential for exposure to Level A harassment (harassment resulting in injury). The rest of the in-water components of the project are provided here for completeness. Note that many of the support piles will be installed to an elevation below MHW or HTL; however, they will be installed within the enclosed fill of the sheet pile dock rather than in the water.

Utilities will be installed during Phase II, and include addition/extension of water, sewer, fuel, electrical, and storm drain. Authorization to construct the sewer and storm

drain extension, as well as a letter of non-objection for the storm drain, will be obtained from the State of Alaska Department of Environmental Conservation (ADEC).

Each element is further described below.

Demolition of Existing Infrastructure

Demolition of the existing dock and removal of any existing riprap or obstructions will be performed with track excavators, loaders, cranes, barges, cutting equipment, a vibratory hammer (for pile extraction), and labor forces. The existing dock (consisting of steel support piles, steel superstructure, and concrete deck) will be completely removed for construction of the new dock. Vibratory pile removal will generally consist of clamping the vibratory hammer to the pile and vibrating the hammer while extracting to a point where the pile is temporarily secured and removal can be completed with crane line rigging under tension. The pile is then completely removed from the water by hoisting with crane line rigging and placing on the ground or deck of the barge.

The contractor will be required to dispose of (or salvage) demolished items in accordance with all federal, state, and local regulations. Dewatering will not be required, as all extraction will take place from the existing dock, from shore, and/or from a work barge.

Quarry Development

Concurrent with dock construction, a material source will be developed in the hillside adjacent to the UMC facility. The quarry will provide fill material for the dock and future projects. Material will be extracted from the quarry in a configuration that provides additional upland space for port operations. Flat uplands area will be used for

COU port offices after the quarry is completed. The quarry will be developed through blasting benches in the rock face, with each bench approximately 25 feet high and the total height approximately 125 feet.

Temporary Support Piles

Temporary support piles for pile driving template structures will be installed to aid with construction and will be removed after the permanent sheet piles or support piles have been installed. Figure 3 shows temporary support piles and templates being used during pile installation. Temporary support piles will likely be steel H-piles (18-inch or smaller) or steel round piles (18-inch diameter or smaller). It is estimated that up to ten (10) temporary support piles will be used per cell during construction of the sheet pile structure. Installation methods for the temporary support piles will be similar to the fender support piles (described below).

Sheet Pile Installation

The new sheet pile bulkhead dock consists of twenty-two (22) OCSP cells. The sheet pile structures will be installed utilizing a crane and vibratory hammer. It is anticipated that the largest size vibratory hammer used for the project will be an APE 200-6 (eccentric moment of 6,600 inch-pounds) or comparable vibratory hammer from another manufacturer such as ICE or HPSI. After all the piles for a sheet pile cell have been installed, clean rock fill will be placed within the cell. This process will continue sequentially until all of the sheet pile cells are installed and backfilled.

Dock Fill Placement

Fill will be transported from the adjacent quarry to the project site using loaders, dump trucks, and dozers and may be temporarily stockpiled within the project footprint as needed. It will be placed within the cells from the shore (or occasionally a barge) using the same equipment and will be finished using roller compactors, graders, or vibracompaction. Vibracompaction would be achieved through the repeated insertion and removal through vibratory hammering of an H-pile probe, causing fill materials to settle into place.

Fender and Platform Support Piles

Fender support piles will be installed adjacent to (and offshore of) the sheet pile cells and cut to elevation. The fender piles will first be driven with a vibratory hammer and, if capacity/embedment is not achieved, finally driven with an impact hammer until proper embedment and capacity is reached (likely 20-foot embedment). Pre-assembled fender systems (energy absorbers, sleeve piles, steel framing, and fender panels) will be lifted and installed onto fender support piles via crane.

In addition to the fender supports, miscellaneous support piles needed to support the suspended concrete platform at the transitions between Position II/III and IV/V will be installed and cut to elevation. Installation methods for the miscellaneous support piles will be similar to the fender support piles. Approximately forty (40) 30-inch steel piles will be driven for the fenders and transition platform.

Miscellaneous Support Piles

Support piles for upland utilities and other structures will be driven after sheet pile cells are completed. Though the piles will be driven beyond the current MHW line,

the cells will be filled and compacted at the time of placement, making this upland pile driving. Approximately thirty (30) steel support piles are needed for dock infrastructure.

Crane Rail Support Piles

Approximately one hundred fifty (150) steel support piles will be driven to support the weight of a new crane rail and dock crane. Pile driving will be performed primarily within the completely filled and compacted sheet pile cells. A few of the support piles may be driven in the water at the transition areas.

Dock Surfacing and Other Concrete Elements

The new dock uplands area will be surfaced with concrete pavement. The crane rail beam and utility vaults will be constructed from cast-in-place concrete. The surfacing and structures will be installed using forms and reinforcement steel. This work will take place at or near the surface of the dock and will be above water.

Utilities

Temporary utilities will be installed to provide functional dock capability for the 2017/2018 season. Typical utility installation equipment such as track excavators, wheel loaders, and compaction equipment will be used. Permanent electrical, water, and storm drainage utilities will be installed during Phase 2 to provide full dock capability. Installation methods will require equipment similar to that used to install the temporary utilities. All storm water (and any other wastewater) from the dock will be processed through the COU stormwater system and necessary separator devices.

Details of all planned construction work, and photos of many of the construction techniques described above, can be found in Section 1 of the application.

Description of Marine Mammals in the Area of the Specified Activity

Marine waters near Unalaska Island support many species of marine mammals, including pinnipeds and cetaceans; however, the number of species regularly occurring within Dutch Harbor, including near the project location is limited due to the high volume of vessel traffic in and around the harbor. Due to this, Steller sea lion, harbor seal, humpback whale, and killer whale are the only species within NMFS jurisdiction that are being included in the COA's IHA request. Sightings of other marine mammals within Dutch Harbor are extremely rare, and therefore, no further descriptions of the other marine mammals are included in the COA's application or in this notice of proposed authorization.

We have reviewed COA's species descriptions—which summarize available information regarding status and trends, distribution and habitat preferences, behavior and life history, and auditory capabilities of the potentially affected species—for accuracy and completeness and refer the reader to Sections 3 and 4 of the application. Please also refer to NMFS' website (*www.nmfs.noaa.gov/pr/species/mammals/*) for generalized species accounts.

Table 2 lists the marine mammal species with the potential for occurrence in the vicinity of the project during the project timeframe and summarizes key information regarding stock status and abundance. Please see NMFS' Stock Assessment Reports (SAR; Muto *et al*., 2016), available at *http://www.nmfs.noaa.gov/pr/sars*, for more detailed accounts of these stocks' status and abundance.

Table 2. Marine mammals potentially present in the vicinity of the project location.

Species	Stock	MMPA Status	ESA Status	Occurrence In/Near Project	Seasonality	Abundance
Harbor seal (*Phoca vitulina richardsi*)	Aleutian Islands	Protected	-	Common	Year-round	5,772
Steller sea lion (*Eumetopias jubatus*)	Western Distinct Population Segment (DPS)	Depleted, Strategic	Endangered	Common	Year-round	49,497
Killer whale (*Orcinus orca*)	Eastern North Pacific, Alaska Resident	Protected	-	Unknown	Summer, Fall	2,347
Killer whale (*Orcinus orca*)	Gulf of Alaska, Aleutian Islands, and Bering Sea Transient	Protected	-	Unknown	Year-round	587
Humpback whale (*Megaptera novaeangliae*)	Central North Pacific	Depleted, Strategic	n/a*	Seasonal	Summer	10,103
Humpback whale (*Megaptera novaeangliae*)	Western North Pacific	Depleted, Strategic	n/a*	Seasonal	Summer	1,107

*The newly defined DPSs (81 FR 62259) do not currently align with the stocks under the MMPA.

Potential Effects of the Specified Activity on Marine Mammals

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals. The "Estimated Take by Incidental Harassment" section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The "Negligible Impact Analysis" section will include the analysis of how this specific activity will impact marine mammals and will consider the content of this section, the "Estimated Take by Incidental Harassment" section, the "Proposed Mitigation" section, and the "Anticipated Effects on Marine Mammal Habitat" section to draw conclusions regarding the likely impacts of this activity on the reproductive success or survivorship of

individuals and from that on the affected marine mammal populations or stocks. In the following discussion, we provide general background information on sound and marine mammal hearing before considering potential effects to marine mammals from sound produced by the construction techniques proposed for use.

Description of Sound Sources

Sound travels in waves, the basic components of which are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks of a sound wave; lower frequency sounds have longer wavelengths than higher frequency sounds and attenuate (decrease) more rapidly in shallower water. Amplitude is the height of the sound pressure wave or the 'loudness' of a sound and is typically measured using the decibel (dB) scale. A dB is the ratio between a measured pressure (with sound) and a reference pressure (sound at a constant pressure, established by scientific standards). It is a logarithmic unit that accounts for large variations in amplitude; therefore, relatively small changes in dB ratings correspond to large changes in sound pressure. When referring to sound pressure levels (SPLs; the sound force per unit area), sound is referenced in the context of underwater sound pressure to 1 microPascal (μPa). One pascal is the pressure resulting from a force of one newton exerted over an area of one square meter. The source level (SL) represents the sound level at a distance of 1 m from the source (referenced to 1 μPa). The received level is the sound level at the listener's position. Note that all underwater

sound levels in this document are referenced to a pressure of 1 µPa and all airborne sound levels in this document are referenced to a pressure of 20 µPa.

Root mean square (rms) is the quadratic mean sound pressure over the duration of an impulse, and is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick, 1983). Rms accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in all directions away from the source (similar to ripples on the surface of a pond), except in cases where the source is directional. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound. Ambient sound is defined as environmental background sound levels lacking a single source or point (Richardson *et al*., 1995), and the sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g*., waves, earthquakes, ice, atmospheric sound), biological (*e.g*., sounds produced by marine

mammals, fish, and invertebrates), and anthropogenic sound (*e.g.*, vessels, dredging, aircraft, construction). A number of sources contribute to ambient sound, including the following (Richardson *et al*., 1995):

- Wind and waves: The complex interactions between wind and water surface, including processes such as breaking waves and wave-induced bubble oscillations and cavitation, are a main source of naturally occurring ambient noise for frequencies between 200 Hz and 50 kHz (Mitson, 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Surf noise becomes important near shore, with measurements collected at a distance of 8.5 km from shore showing an increase of 10 dB in the 100 to 700 Hz band during heavy surf conditions.
- Precipitation: Sound from rain and hail impacting the water surface can become an important component of total noise at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times.
- Biological: Marine mammals can contribute significantly to ambient noise levels, as can some fish and shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz.
- Anthropogenic: Sources of ambient noise related to human activity include transportation (surface vessels and aircraft), dredging and construction, oil and gas drilling and production, seismic surveys, sonar, explosions, and ocean acoustic studies. Shipping noise typically dominates the total ambient noise for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic

sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly (Richardson *et al*., 1995). Sound from identifiable anthropogenic sources other than the activity of interest (*e.g*., a passing vessel) is sometimes termed background sound, as opposed to ambient sound.

The sum of the various natural and anthropogenic sound sources at any given location and time—which comprise "ambient" or "background" sound—depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson *et al*., 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

In-water construction activities associated with the project would include impact pile driving and vibratory pile driving. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive (defined in the following). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g*., Ward, 1997 in

Southall *et al*., 2007). Please see Southall *et al*., (2007) for an in-depth discussion of these concepts.

Impulsive sound sources (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI, 1986; Harris, 1998; NIOSH, 1998; ISO, 2003; ANSI, 2005) and occur either as isolated events or repeated in some succession. Impulsive sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Non-impulsive sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or non-continuous (ANSI, 1995; NIOSH, 1998). Some of these non-impulsive sounds can be transient signals of short duration but without the essential properties of pulses (*e.g.*, rapid rise time). Examples of non-impulsive sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, down-the-hole drilling, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005). Vibratory hammers install piles by vibrating them and allowing the

weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak SPLs may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al*., 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards, 2002; Carlson *et al*., 2005).

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals, and exposure to sound can have deleterious effects. To appropriately assess these potential effects, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al*., 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al*. (2007) recommended that marine mammals be divided into functional hearing groups based on measured or estimated hearing ranges on the basis of available behavioral data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. The lower and/or upper frequencies for some of these functional hearing groups have been modified from those designated by Southall *et al*. (2007), and the revised generalized hearing ranges are presented in the new Guidance. The functional hearing groups and the associated frequencies are indicated in Table 3 below.

Table 3. Marine mammal hearing groups and their generalized hearing range.

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* and *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
***** Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*., 2007) and PW pinniped (approximation).	

Acoustic Effects, Underwater

Potential Effects of Pile Driving Sound – The effects of sounds from pile driving might result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson *et al*., 1995; Gordon *et al*., 2004; Nowacek *et al*., 2007; Southall *et al*., 2007). The effects of pile driving on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is

intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, substrates that are soft (*e.g.*, sand) would absorb or attenuate the sound more readily than hard substrates (*e.g.*, rock) which may reflect the acoustic wave. Soft porous substrates would also likely require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the intensity of the acoustic source.

In the absence of mitigation, impacts to marine species would be expected to result from physiological and behavioral responses to both the type and strength of the acoustic signature (Viada *et al*., 2008). The type and severity of behavioral impacts are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al*., 1973).

Hearing Impairment and Other Physical Effects – Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al*., 1999; Schlundt *et al*., 2000; Finneran *et al*., 2002, 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not recoverable, or temporary

(TTS), in which case the animal's hearing threshold would recover over time (Southall *et al*., 2007). Marine mammals depend on acoustic cues for vital biological functions (*e.g*., orientation, communication, finding prey, avoiding predators); thus, TTS may result in reduced fitness in survival and reproduction. However, this depends on the frequency and duration of TTS, as well as the biological context in which it occurs. TTS of limited duration, occurring in a frequency range that does not coincide with that used for recognition of important acoustic cues, would have little to no effect on an animal's fitness. Repeated sound exposure that leads to TTS could cause PTS. PTS constitutes injury, but TTS does not (Southall *et al*., 2007). The following subsections discuss in somewhat more detail the possibilities of TTS, PTS, and non-auditory physical effects.

Temporary Threshold Shift – TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes or hours to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall *et al*. (2007) and more recently in Finneran (2016).

Marine mammal hearing plays a critical role in communication with conspecifics, and interpretation of environmental cues for purposes such as predator avoidance and

prey capture. Depending on the degree (elevation of threshold in dB), duration (*i.e.*, recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that occurs during a time where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts.

Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin, beluga whale, harbor porpoise, and Yangtze finless porpoise) and three species of pinnipeds (northern elephant seal, harbor seal, and California sea lion) exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise) in laboratory settings (*e.g.*, Finneran, 2016; Finneran *et al*., 2002; Finneran and Schlundt, 2010, 2013; Nachtigall *et al*., 2004; Kastaket *et al*., 2005; Lucke *et al*., 2009; Popov *et al*., 2011). In general, harbor seals and harbor porpoises have a lower TTS onset than other measured pinniped or cetacean species (Kastak *et al*., 2005; Kastelein *et al*., 2011, 2012a, 2012b, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2015c, 2016). Additionally, the existing marine mammal TTS data come from a limited number of individuals within these species. There are no data available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset

thresholds, please see Southall et al. (2007), Finneran and Jenkins (2012), and Finneran (2016).

Permanent Threshold Shift – When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985). There is no specific evidence that exposure to pulses of sound can cause PTS in any marine mammal. However, given the possibility that mammals close to a sound source might incur TTS, there has been further speculation about the possibility that some individuals might incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals. Available data from humans and other terrestrial mammals indicate that a 40 dB threshold shift approximates PTS onset (see Ward *et al*., 1958; Ward *et al*., 1959; Ward, 1960; Kryter *et al*., 1966; Miller, 1974; Ahroon *et al*., 1996; Henderson et al., 2008). Southall *et al*., (2007) also recommended this definition of PTS onset.

PTS onset acoustic thresholds for marine mammals have not been directly measured and must be extrapolated from available TTS onset measurements. Thus, based on cetacean measurements from TTS studies (see Southall *et al*., 2007; Finneran, 2015; Finneran, 2016 (found in Appendix A of the Guidance)) a threshold shift of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-

session variation in a subject's normal hearing ability and is typically the minimum amount of threshold shift that can be differentiated in most experimental conditions (Finneran *et al*., 2000; Schlundt *et al*., 2000; Finneran *et al*., 2002).

Measured source levels from impact pile driving can be as high as 214 dB rms. Although no marine mammals have been shown to experience TTS or PTS as a result of being exposed to pile driving activities, captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong pulsed sounds (Finneran *et al*., 2000, 2002, 2005). The animals tolerated high received levels of sound before exhibiting aversive behaviors. Experiments on a beluga whale showed that exposure to a single watergun impulse at a received level of 207 kilopascal (kPa) (30 psi) peak-to-peak (p-p), which is equivalent to 228 dB p-p, resulted in a 7 and 6 dB TTS in the beluga whale at 0.4 and 30 kHz, respectively. Thresholds returned to within 2 dB of the pre-exposure level within four minutes of the exposure (Finneran *et al*., 2002). Although the source level of pile driving from one hammer strike is expected to be much lower than the single watergun impulse cited here, animals being exposed for a prolonged period to repeated hammer strikes could receive more sound exposure in terms of sound exposure level (SEL) than from the single watergun impulse (estimated at 188 dB re 1 μPa^2-s) in the aforementioned experiment (Finneran *et al*., 2002). However, in order for marine mammals to experience TTS or PTS, the animals have to be close enough to be exposed to high intensity sound levels for a prolonged period of time. Based on the best scientific information available, these SPLs are below the thresholds that could cause TTS or the onset of PTS.

Non-auditory Physiological Effects – Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al*., 2006; Southall *et al*., 2007). Studies examining such effects are limited. In general, little is known about the potential for pile driving to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al*., 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in those ways. Marine mammals that show behavioral avoidance of pile driving, including some odontocetes and some pinnipeds, are especially unlikely to incur auditory impairment or non-auditory physical effects.

Disturbance Reactions

Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g*., minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g*., species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of

day), as well as the interplay between factors (*e.g.*, Richardson *et al*.,1995; Wartzok *et al*., 2003; Southall *et al*., 2007; Weilgart, 2007; Archer *et al*.,2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al*., 2012), and can vary depending on characteristics associated with the sound source (*e.g.*, whether it is moving or stationary, number of sources, distance from the source). Please see Appendices B-C of Southall *et al.* (2007) for a review of studies involving marine mammal behavioral responses to sound.

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al*., 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a "progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial," rather than as, more generally, moderation in response to human disturbance (Bejder *et al.*, 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al*., 1995; NRC, 2003; Wartzok *et al*., 2003). Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al*., 1997; Finneran *et al*., 2003). Observed responses of wild marine

mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; Thorson and Reyff, 2006; see also Gordon *et al*., 2004; Wartzok *et al*., 2003; Nowacek *et al*., 2007). Responses to continuous sound, such as vibratory pile installation, have not been documented as well as responses to pulsed sounds.

With both types of pile driving, it is likely that the onset of pile driving could result in temporary, short term changes in an animal's typical behavior and/or avoidance of the affected area. These behavioral changes may include (Richardson *et al*., 1995): changing durations of surfacing and dives, number of blows per surfacing (cetaceans only), or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior; avoidance of areas where sound sources are located; and/or flight responses (*e.g*., pinnipeds flushing into water from haul-outs or rookeries). Pinnipeds may increase the amount of time spent hauled out, possibly to avoid in-water disturbance (Thorson and Reyff, 2006). Since pile driving would likely only occur for a few hours a day, over a short period of time, it is unlikely to result in permanent displacement. Any potential impacts from pile driving activities could be experienced by individual marine mammals, but would not be likely to cause population level impacts, or affect the long-term fitness of the species.

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences

of behavioral modification could be expected to be biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could potentially lead to effects on growth, survival, or reproduction include:

- Drastic changes in diving/surfacing patterns (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography) and is difficult to predict (Southall *et al*., 2007).

Auditory Masking

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from

maximizing their performance fitness in survival and reproduction. If the coincident (masking) sound were man-made, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Because sound generated from in-water pile driving is mostly concentrated at low frequency ranges, it may affect detection of communication calls and other potentially important natural sounds such as surf and prey sound. It may also affect communication signals when they occur near the sound band and thus reduce the communication space of animals (*e.g.*, Clark *et al*., 2009) and cause increased stress levels (*e.g.*, Foote *et al*., 2004; Holt *et al*., 2009).

Masking has the potential to impact species at the population or community levels as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand, 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

The most intense underwater sounds in the proposed action are those produced by impact pile driving. Given that the energy distribution of pile driving covers a broad frequency spectrum, sound from these sources would likely be within the audible range of marine mammals present in the project area. Impact pile driving activity is relatively short-term, with rapid pulses occurring for approximately fifteen minutes per pile. The probability for impact pile driving resulting from the proposed action to mask acoustic signals important to the behavior and survival of marine mammal species is likely to be negligible. Vibratory pile driving is also relatively short-term, with rapid oscillations occurring for approximately one and a half hours per pile. It is possible that vibratory pile driving resulting from the proposed action may mask acoustic signals important to the behavior and survival of marine mammal species, but the short-term duration and limited affected area would result in insignificant impacts from masking. Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile driving, and which have already been taken into account in the exposure analysis.

Acoustic Effects, Airborne

Marine mammals that occur in the project area could be exposed to airborne sounds associated with pile driving and blasting activities at the quarry that have the potential to cause harassment, depending on their distance from these activities. Airborne sound could potentially affect pinnipeds that are either hauled out or are in the water but have their heads above water in the project area. Most likely, airborne sound would cause

behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could cause hauled out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon their habitat and move further from the source. Studies by Blackwell *et al*. (2004) and Moulton *et al*. (2005) indicate a tolerance or lack of response to unweighted airborne sounds as high as 112 dB peak and 96 dB rms.

Anticipated Effects on Habitat

The proposed activities at Dutch Harbor would not result in permanent impacts to habitats used directly by marine mammals, such as haul-out sites, but may have potential short-term impacts to food sources such as forage fish and salmonids. There are no rookeries or haulout sites within the modeled zone of influence for impact or vibratory pile driving associated with the project, or ocean bottom structure of significant biological importance to marine mammals that may be present in the waters in the vicinity of the project area. The project location receives heavy use by vessel moorage and factory trawler offloads, and experiences frequent vessel traffic because of these activities, thus the area is already relatively industrialized and not a pristine habitat for marine mammals. As such, the main impact associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The most likely impact to marine mammal habitat occurs from pile driving effects on likely marine mammal prey (*i.e.*, fish) near the project location, and minor impacts to the immediate substrate during installation and removal of piles during the dock construction project.

Effects on Potential Prey

Construction activities would produce both impulsive (*i.e.*, impact pile driving and quarry blasting) and non-impulsive continuous (*i.e.*, vibratory pile driving) sounds. Fish react to sounds which are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (*e.g.*, Scholik and Yan, 2001, 2002; Popper and Hastings, 2009) and are therefore not directly comparable with the proposed project. Sound pulses at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson *et al*., 1992; Skalski *et al*., 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality. In general, impacts to marine mammal prey species from the proposed project are expected to be minor and temporary due to the relatively short timeframe of the proposed project, and the fact that Dutch Harbor is not considered an important habitat for salmonids. The nearby Iliuliuk River supports salmon runs for at least four species of salmonids, however the harbor itself does not provide significant habitat for salmonids, and the proposed project is located far enough away from the lower Iliuliuk River that the potential that fish entering or leaving the river will be impacted is considered discountable. The most likely impact to fish from pile driving activities at the project area would be temporary behavioral avoidance of the area. The duration of fish

avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated.

Effects on Potential Foraging Habitat

The area likely impacted by the project is very small relative to the available habitat in Unalaska Bay. Avoidance by potential prey (*i.e.*, fish) of the immediate area due to the temporary loss of this foraging habitat is possible. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in Unalaska Bay and the nearby vicinity.

In summary, given the short daily duration of sound associated with individual pile driving events and the relatively small area that would be affected, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. Thus, any impacts to marine mammal habitat are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

Proposed Mitigations

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses.

The COU's calculation of the Level A harassment zones utilized the methods presented in Appendix D of NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (the Guidance, available at *http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*), and the accompanying User Spreadsheet[1]. The Guidance provides updated PTS onset thresholds using the cumulative SEL (SEL_{cum}) metric, which incorporates marine mammal auditory weighting functions, to identify the received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity for acute, incidental exposure to all underwater anthropogenic sound sources. The Guidance (Appendix D) and its companion User Spreadsheet provide alternative methodology for incorporating these more complex thresholds and associated weighting functions.

The User Spreadsheet accounts for effective hearing ranges using Weighting Factor Adjustments (WFAs), and the COU's application uses the recommended values for vibratory and impact driving therein. Pile driving durations were estimated based on similar project experience. NMFS' new acoustic thresholds use dual metrics of SEL_{cum} and peak sound level (PK) for impulsive sounds (*e.g.*, impact pile driving) and SEL_{cum} for non-impulsive sounds (*e.g.*, vibratory pile driving) (Table 4). The COU used source level measurements from similar pile driving events (as described in "Estimated Take by Incidental Harassment"), and using the User Spreadsheet, applied the updated PTS onset thresholds for impulsive PK and SEL_{cum} in the new acoustic guidance to determine distance to the isopleths for PTS onset for impact pile driving. For vibratory pile driving,

[1] For most recent version of the NMFS User Spreadsheet, see: *http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*

the COU used the User Spreadsheet to determine isopleth estimates for PTS onset using the cumulative sound exposure level metric (L_E) (*http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm*). In determining the cumulative sound exposure levels, the Guidance considers the duration of the activity, the sound exposure level produced by the source during one working day, and the effective hearing range of the receiving species. In the case of the duel metric acoustic thresholds (L_{pk} and L_E) for impulsive sound, the larger of the two isopleths for calculating PTS onset is used. These values were then used to develop mitigation measures for proposed pile driving activities. The exclusion zone effectively represents the mitigation zone that would be established around each pile to prevent Level A harassment (PTS onset) to marine mammals (Table 5), while the zones of influence (ZOI) provide estimates of the areas within which Level B harassment might occur for impact/vibratory pile driving and quarry blasting (Table 6).

Table 4. Summary of PTS onset acoustic thresholds.

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	**Impulsive**	**Non-impulsive**
Low-Frequency (LF) Cetaceans	*Cell 1* Lpk,flat*:* 219 dB L_E,LF,24h*:* 183 dB	*Cell 2* L_E,LF,24h*:* 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* Lpk,flat: 230 dB L_E,MF,24h: 185 dB	*Cell 4* LE,MF,24h: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* Lpk,flat: 202 dB L_E,HF,24h: 155 dB	*Cell 6* LE,HF,24h: 173 dB

Phocid Pinnipeds (PW) (Underwater)	*Cell 7* Lpk,flat: 218 dB L_E,PW,24h: 185 dB	*Cell 8* L_E,PW,24h: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* Lpk,flat: 232 dB L_E,OW,24h: 203 dB	*Cell 10* LE,OW,24h: 219 dB

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Monitoring and Shutdown for Pile Driving

The following measures would apply to the COU's mitigation through the exclusion zone and zone of influence:

Exclusion Zone – For all pile driving activities, the COU will establish an exclusion zone intended to contain the area in which Level A harassment thresholds are exceeded. The purpose of the exclusion zone is to define an area within which shutdown of construction activity would occur upon sighting of a marine mammal within that area (or in anticipation of an animal entering the defined area), thus preventing potential injury of marine mammals. Calculated distances to the updated PTS onset acoustic thresholds are shown in Table 5. The greatest calculated distance to the Level A harassment

threshold during impact pile driving, assuming a maximum of 5 piles driven per day, is 184.5 m for low-frequency cetaceans (humpback whale). For mid-frequency cetaceans (killer whale), phocid pinnipeds (harbor seal), and otariid pinnipeds (Steller sea lion), the distances are 6.6 m, 98.6 m, and 7.2 m, respectively (Table 5). Calculated distances to the PTS onset threshold during vibratory pile driving range from a maximum of 9.2 m for low-frequency cetaceans to 0.20 m for otariids—depending on the specific type of piles/sheets that are installed or removed (Table 5).

Table 5. Pile driving activities and calculated distances to Level A harassment isopleths (onset PTS threshold using NMFS' new acoustic guidance).

Source	Estimated Duration				Level A Harassment Zone (m) (New Guidance)			
	Number of Piles	Piles Driven per Day	Hours per Day	Days of Effort	LF Cetaceans	MF Cetaceans	PW Pinnipeds	OW Pinnipeds
Vibratory Installation Sheet	1,400	15	0.5	95	4.1	0.4	2.5	0.2
Vibratory Installation 18"	150	10	1.25	15	5.0	0.4	3.0	0.2
Vibratory Installation 30"	40	5	1	8	5.0	0.4	3.1	0.2
Vibratory Installation 30"	30	5	1	6	5.0	0.4	3.1	0.2
Vibratory Installation 30"	125	5	2	25	8.0	0.7	4.8	0.3
Vibratory Removal Steel 18"	195	10	1.25	35	5.0	0.4	3.0	0.2
Vibratory Removal Steel 18"	150	10	1.25	35	5.0	0.4	3.0	0.2

Vibratory Removal Timber	55	10	1.25	5.5	9.2	0.8	5.6	0.4
	Number of Piles	**Piles Driven per Day**	**Strikes per Pile**	**Days of Effort**	**LF Cetaceans**	**MF Cetaceans**	**PW Pinnipeds**	**OW Pinnipeds**
Impact Installation 30" (SEL Calc)*	195	5	200	39	184.5	6.6	98.8	7.2
		4			159.0	5.7	85.1	6.2
		3			131.3	4.7	70.3	5.1
		2			100.2	3.6	53.6	3.9
		1			63.1	2.2	33.8	2.5

*Distances to the Level A harassment (PTS onset) isopleth are based on the cumulative sound exposure level (L_E) acoustic threshold; the modeled distances to the PTS onset isopleth were smaller using the Lpk metric (see Table 8 in the application), and therefore, not used to establish shutdown zones.

The established shutdown zones corresponding to the Level A harassment zones for each activity are as follows:

- For all vibratory pile driving activities, a 10-m radius shutdown zone will be employed for all species observed
- During impact pile driving, a shutdown zone will be determined by the number of piles to be driven that day as follows: If the maximum of five piles are to be driven that day, shutdown during the first driven pile will occur if a marine mammal enters the '5-pile' radius. After the first pile is driven, if no marine mammals have been observed within the '5-pile'radius, the '4-pile' radius will become the shutdown radius. This pattern will continue unless an animal is observed within the most recent shutdown radius, at which time that shutdown radius will remain in effect for the rest of the workday. Shutdown radii for each species, depending on number of piles driven, are as follows:
    - 5-pile radius: humpback whale, 185 m; killer whale, 10 m; harbor seal, 100 m; Steller sea lion, 10 m
    - 4-pile radius: humpback whale, 160 m; killer whale, 10 m; harbor seal, 85 m; Steller sea lion, 10 m

- 3-pile radius: humpback whale, 135 m; killer whale, 10 m; harbor seal, 70 m; Steller sea lion, 10 m
- 2-pile radius: humpback whale, 100 m; killer whale, 10 m; harbor seal, 55 m; Steller sea lion, 10 m
- 1-pile radius: humpback whale, 65 m; killer whale, 10 m; harbor seal, 35 m; Steller sea lion, 10 m

A shutdown will occur prior to a marine mammal entering a shutdown zone appropriate for that species and the concurrent work activity. Activity will cease until the observer is confident that the animal is clear of the shutdown zone: The animal will be considered clear if:

- It has been observed leaving the shutdown zone; or
- It has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.

If shutdown lasts for more than 30 minutes, pre-activity monitoring (see below) must recommence.

If the exclusion zone is obscured by fog or poor lighting conditions, pile driving will not be initiated until the exclusion zone is clearly visible. Should such conditions arise while impact driving is underway, the activity would be halted.

Level B Harassment Zone (Zone of Influence) – The zone of influence (ZOI) refers to the area(s) in which SPLs equal or exceed NMFS' current Level B harassment thresholds (160 and 120 dB rms for pulsed and non-pulsed continuous sound, respectively). ZOIs provide utility for monitoring that is conducted for mitigation

purposes (*i.e.*, exclusion zone monitoring) by establishing monitoring protocols for areas adjacent to the exclusion zone. Monitoring of the ZOI enables observers to be aware of, and communicate about, the presence of marine mammals within the project area but outside the exclusion zone and thus prepare for potential shutdowns of activity should those marine mammals approach the exclusion zone. However, the primary purpose of ZOI monitoring is to allow documentation of incidents of Level B harassment; ZOI monitoring is discussed in greater detail later (see "Proposed Monitoring and Reporting"). The modeled radial distances for ZOIs for impact and vibratory pile driving and removal (not taking into account landmasses which are expected to limit the actual ZOI radii) are shown in Table 7.

In order to document observed incidents of harassment, monitors will record all marine mammals observed within the ZOI. Modeling was performed to estimate the ZOI for impact pile driving (the areas in which SPLs are expected to equal or exceed 160 dB rms during impact driving) and for vibratory pile driving (the areas in which SPLs are expected to equal or exceed 120 dB rms during vibratory driving and removal). Results of this modeling showed the ZOI for impact driving would extend to a radius of 462 m from the pile being driven and the ZOI for vibratory pile driving would extend to a maximum radius of 5,168 m from the pile being driven (see Section 5 of the application for the radius of each type of vibratory pile installation and removal). However, due to the geography of the project area, landmasses surround Dutch Harbor and Iliuliuk Bay are expected to limit the propagation of sound from construction activities such that the actual distances to the ZOI extent for vibratory pile driving will be substantially smaller

than those described above. Modeling results of the ensonified areas, taking into account the attenuation provided by landmasses, suggest the actual ZOI will extend to a maximum distance of 3,300 m for vibratory driving. Due to this adjusted ZOI, and due to the monitoring locations chosen by the COU (see the Monitoring Plan in Appendix E of the application for details), we expect that monitors will be able to observe the entire modeled ZOI for both impact and vibratory pile driving, and thus we expect data collected on incidents of Level B harassment to be relatively accurate. The modeled areas of the ZOIs for impact and vibratory driving, taking into account the attenuation provided by landmasses in attenuating sound from the construction project, are shown in Appendix B of the application. The actual Level B harassment/monitoring zones for impact pile driving (500 m) and vibratory pile driving (3,300 m) are shown in Table 7.

Marine Mammal Monitoring

Qualified observers will be on site before, during, and after all pile-driving activities. The proposed Level A and Level B harassment zones for underwater noise will be monitored before, during, and after all in-water construction activity. The observers will be authorized to shut down activity if pinnipeds or cetaceans are observed approaching or within the shutdown zone of any construction activities.

Observers will follow observer protocols, meet training requirements, fill out data forms and report findings in accordance with protocols reviewed and approved by NMFS. A detailed Marine Mammal Monitoring Plan is found in Appendix E of the application.

If marine mammals are observed approaching or within the shutdown zone, shutdown procedures will be implemented to prevent unauthorized exposure. If marine mammals are observed within the monitoring zone (ZOI), the sighting will be documented as a potential Level B take and the animal behaviors shall be documented. If the number of marine mammals exposed to Level B harassment approaches the number of takes allowed by the IHA, the COU will notify NMFS and seek further consultation. If any marine mammal species are encountered that are not authorized by the IHA and are likely to be exposed to sound pressure levels greater than or equal to the Level B harassment thresholds, then the COU will shut down in-water activity to avoid take of those species.

Pre-Activity Monitoring

Prior to the start of daily in-water construction activity, or whenever a break in pile driving of 30 minutes or longer occurs, the observer will observe the shutdown and monitoring zones for a period of 30 minutes. The shutdown zone will be cleared when a marine mammal has not been observed within zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start (described below) cannot proceed until the marine mammal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans). If the Level B harassment zone has been observed for 30 minutes and non-permitted species are not present within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Level B zone. If the Level B zone is not visible while work continues, exposures will be recorded at the estimated exposure rate for each permitted

species. If work ceases for more than 30 minutes, the pre-activity monitoring of both zones must recommence

Soft Start

The use of a "soft-start" procedure is believed to provide additional protection to marine mammals by providing a warning and an opportunity to leave the area prior to the hammer operating at full capacity. Soft start procedures will be used prior to pile removal, pile installation, and in-water fill placement to allow marine mammals to leave the area prior to exposure to maximum noise levels. For vibratory hammers, the soft start technique will initiate noise from the hammer for short periods at a reduced energy level, followed by a brief waiting period and repeating the procedure two additional times. For impact hammers, the soft start technique will initiate several strikes at a reduced energy level, followed by a brief waiting period. This procedure would also be repeated two additional times. Equipment used for fill placement will be idled near the waterside edge of the fill area for 15 minutes prior to performing in-water fill placement

In-Water or Over-Water Construction Activities

During in-water or over-water construction activities having the potential to affect marine mammals, but not involving a pile driver, a shutdown zone of 10 m will be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the removal of the pile from the water column/substrate via a crane ("deadpull"), or the slinging of construction materials via crane.

Vessel Interactions

To minimize impacts from vessels interactions with marine mammals, the crews aboard project vessels will follow NMFS's marine mammal viewing guidelines and regulations as practicable. (https://alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm).

Mitigation Conclusions

We have carefully evaluated the COU's proposed mitigation measures and considered their likely effectiveness relative to implementation of similar mitigation measures in previously issued IHAs to preliminarily determine whether they are likely to affect the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

(1) The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;

(2) The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and

(3) The practicability of the measure for applicant implementation.

Based on our evaluation of the COU's proposed measures, we have preliminarily determined that the proposed mitigation measures provide the means of affecting the least practicable impact on marine mammal species or stocks and their habitat.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking." The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for incidental take authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring

Any monitoring requirement we prescribe should accomplish one or more of the following general goals:

1. An increase in the probability of detecting marine mammals, both within defined zones of effect (thus allowing for more effective implementation of the mitigation) and in general to generate more data to contribute to the analyses mentioned below;

2. An increase in our understanding of how many marine mammals are likely to be exposed to stimuli that we associate with specific adverse effects, such as behavioral harassment or hearing threshold shifts;

3. An increase in our understanding of how marine mammals respond to stimuli expected to result in incidental take and how anticipated adverse effects on individuals may impact the population, stock, or species (specifically through effects on annual rates of recruitment or survival) through any of the following methods:

- Behavioral observations in the presence of stimuli compared to observations in the absence of stimuli (need to be able to accurately predict pertinent information, *e.g.*, received level, distance from source);
- Physiological measurements in the presence of stimuli compared to observations in the absence of stimuli (need to be able to accurately predict pertinent information, *e.g.*, received level, distance from source); and
- Distribution and/or abundance comparisons in times or areas with concentrated stimuli versus times or areas without stimuli.

4. An increased knowledge of the affected species; or

5. An increase in our understanding of the effectiveness of certain mitigation and monitoring measures.

The COU submitted a Marine Mammal Monitoring Plan as part of their IHA application (Appendix E of the application; also available online at: *http://www.nmfs.noaa.gov/pr/permits/incidental/*). The COU's proposed Marine Mammal Monitoring Plan was created with input from NMFS and was based on similar plans that have been successfully implemented by other action proponents under previous IHAs for pile driving projects. The plan may be modified or supplemented based on comments or new information received from the public during the public comment period.

Visual Marine Mammal Observations

The COU will collect sighting data and will record behavioral responses to construction activities for marine mammal species observed in the project location during the period of activity. All marine mammal observers (MMOs) will be trained in marine

mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. The COU will monitor the exclusion zone (shutdown zone) and Level B harassment zone before, during, and after pile driving, with observers located at the best practicable vantage points (See Figure 3 in the Marine Mammal Monitoring Plan for the observer locations planned for use during construction). Based on our requirements, the Marine Mammal Monitoring Plan would implement the following procedures for pile driving:

- During observation periods, observers will continuously scan the area for marine mammals using binoculars and the naked eye. Observers will work shifts of a maximum of four consecutive hours followed by an observer rotation or a 1-hour break and will work no more than 12 hours in any 24-hour period.
- Observers will collect data including, but not limited to, environmental conditions (*e.g.*, sea state, precipitation, glare, etc.), marine mammal sightings (*e.g.*, species, numbers, location, behavior, responses to construction activity, etc.), construction activity at the time of sighting, and number of marine mammal exposures. Observers will conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this IHA
- During all observation periods, observers will use binoculars and the naked eye to search continuously for marine mammals.
- If the exclusion zone is obscured by fog or poor lighting conditions, pile driving will not be initiated until the exclusion zone is clearly visible. Should such conditions arise while impact driving is underway, the activity would be halted.
- Observers will implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, clearing of the zones, and shutdown procedures.

- Observers will be in continuous contact with the construction personnel via two-way radio. A cellular phone will be use as back-up communications and for safety purposes.
- Individuals implementing the monitoring protocol will assess its effectiveness using an adaptive approach. MMOs will use their best professional judgment throughout implementation and seek improvements to these methods when deemed appropriate. Any modifications to protocol will be coordinated between NMFS and the COU.

Data Collection

We require that observers use approved data forms. Among other pieces of information, the COU will record detailed information about any implementation of shutdowns, including the distance of animals to the pile being driven, a description of specific actions that ensued, and resulting behavior of the animal, if any. In addition, the COU will attempt to distinguish between the number of individual animals taken and the number of incidents of take, when possible. We require that, at a minimum, the following information be collected on sighting forms:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (*e.g*. percent cloud cover, percent glare, visibility) and Beaufort sea state.
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;

- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile driving activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown; and
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

Sound Source and Attenuation Verification

The companion User Spreadsheet provided with NMFS' new acoustic guidance uses multiple conservative assumption which may result in unrealistically large isopleths associated with PTS onset. The COU may elect to verify the values used for source levels and sound attenuation in the various exclusion radii calculations. This would be achieved using the techniques and equipment for sound source verification discussed in Appendix A of the application. Sound levels would be measured at the earliest possibility during impact pile driving at 10, 100, 300, and 500 m from the sound source. These values would be plotted and a logarithmic line of best fit used to model the attenuation rates experienced at the construction site. If these values are higher than the typically-used value of 15, the exclusion radii will be revised according to the methods used to calculate the current values. The COU must obtain approval from NMFS of any new exclusion zone before it may be implemented.

The COU may elect not to exercise this option, if the cost of shutdown during impact pile driving is not anticipated to warrant additional research.

Reporting

Annual Report

A draft report will be submitted within 90 calendar days of the completion of the activity, The report will include information on marine mammal observations pre-activity, during-activity, and post-activity during pile driving days, and will provide descriptions of any behavioral responses to construction activities by marine mammals and a complete description of any mitigation shutdowns and results of those actions, as well as an estimate of total take based on the number of marine mammals observed during the course of construction. A final report must be submitted within 30 days following resolution of comments from NMFS on the draft report. The report shall include at a minimum:

- General data:
  - Date and time of activity
  - Water conditions (*e.g.*, sea-state)
  - Weather conditions (*e.g.*, percent cover, percent glare, visibility)
- Specific pile driving data:
  - Description of the pile driving activity being conducted (pile locations, pile size and type), and times (onset and completion) when pile driving occurs.
  - The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that pile driving times and strike counts are accurately recorded. The

duration of soft start procedures should be noted as separate from the full power driving duration.

- Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)

- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated
  - Description of any observable marine mammals and their behavior in the immediate area during monitoring
  - Times when pile driving or other in-water construction is delayed due to presence of marine mammals within shutdown zones.
- During-activity observational survey-specific data:
  - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
    - Distance from animal to pile driving sound source.
    - Reason why/why not shutdown implemented.
    - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
    - If a shutdown was implemented, the distance from animal to sound source at the time of the shutdown.
    - Behavioral reactions noted during soft starts and if they occurred before or after implementation of the soft start.
    - Distance to the animal from the sound source during soft start.
- Post-activity observational survey-specific data:

- Results, which include the detections and behavioral reactions of marine mammals, the species and numbers observed, sighting rates and distances,
- Refined exposure estimate based on the number of marine mammals observed. This may be reported as a rate of take (number of marine mammals per hour or per day), or using some other appropriate metric.

General Notifications

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner not authorized by the IHA (if issued), such as a Level A harassment, or a take of a marine mammal species other than those proposed for authorization, the COU would immediately cease the specified activities and immediately report the incident to Jolie Harrison (*Jolie.Harrison@noaa.gov*), Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and Aleria Jensen (*Aleria.Jensen@noaa.gov*), Alaska Stranding Coordinator.

The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;

- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with the COU to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The COU would not be able to resume their activities until notified by NMFS via letter, email, or telephone.

In the event that the COU discovers an injured or dead marine mammal, and determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition), the COU would immediately report the incident to Jolie Harrison (*Jolie.Harrison@noaa.gov*), Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and Aleria Jensen (*Aleria.Jensen@noaa.gov*), Alaska Stranding Coordinator.

The report would include the same information identified in the paragraph above. Construction related activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with the COU to determine whether modifications in the activities are appropriate.

In the event that the COU discovers an injured or dead marine mammal, and determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the COU would report the incident to Jolie Harrison (*Jolie.Harrison@noaa.gov*), Chief of the Permits and Conservation

Division, Office of Protected Resources, NMFS, and Aleria Jensen (*Aleria.Jensen@noaa.gov*), Alaska Stranding Coordinator, within 24 hours of the discovery. The COU would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. The COU can continue its operations under such a case.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as: "…any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment)."

All anticipated takes would be by Level B harassment, resulting from vibratory and impact pile driving and involving temporary changes in behavior. Based on the best available information, the proposed activities—vibratory and impact pile driving—would not result in serious injuries or mortalities to marine mammals even in the absence of the planned mitigation and monitoring measures. Additionally, the proposed mitigation and monitoring measures are expected to minimize the potential for injury, such that take by Level A harassment is considered discountable.

If a marine mammal responds to a stimulus by changing its behavior (*e.g.*, through relatively minor changes in locomotion direction/speed or vocalization behavior), the response may or may not constitute taking at the individual level, and is unlikely to

affect the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on animals or on the stock or species could potentially be significant (*e.g.*, Lusseau and Bejder, 2007; Weilgart, 2007). Given the many uncertainties in predicting the quantity and types of impacts of sound on marine mammals, it is common practice to estimate how many animals are likely to be present within a particular distance of a given activity, or exposed to a particular level of sound.

This practice potentially overestimates the numbers of marine mammals taken, as it is often difficult to distinguish between the individual animals harassed and incidences of harassment. In particular, for stationary activities, it is more likely that some smaller number of individuals may accrue a number of incidences of harassment per individual than for each incidence to accrue to a new individual, especially if those individuals display some degree of residency or site fidelity and the impetus to use the site (*e.g.*, because of foraging opportunities) is stronger than the deterrence presented by the harassing activity.

The COU has requested authorization for the incidental taking of small numbers of Steller sea lions, harbor seals, humpback whales, and killer whales that may result from pile driving activities associated with the UMC dock construction project described previously in this document. In order to estimate the potential incidents of take that may occur incidental to the specified activity, we must first estimate the extent of the sound field that may be produced by the activity and then incorporate information about marine mammal density or abundance in the project area. We first provide information on

applicable sound thresholds for determining effects to marine mammals before describing the information used in estimating the sound fields, the available marine mammal density or abundance information, and the method of estimating potential incidences of take.

Sound Thresholds

We use sound exposure thresholds to determine when an activity that produces sound might result in impacts to a marine mammal such that a "take" by harassment might occur. As discussed above, NMFS has recently revised PTS (and temporary threshold shift) onset acoustic thresholds for impulsive and non-impulsive sound as part of its new acoustic guidance (refer to Table 4 for those thresholds). The Guidance does not address Level B harassment, nor airborne noise harassment; therefore, COA uses the current NMFS acoustic exposure criteria to determine exposure to airborne and underwater noise sound pressure levels for Level B harassment (Table 6).

Table 6. Current NMFS acoustic exposure criteria for Level B harassment.

Criterion	Definition	Threshold
Level B harassment (underwater)	Behavioral disruption	160 dB re: 1 µPa (impulsive source*) / 120 dB re: 1 µPa (continuous source*) (rms)
Level B harassment (airborne)**	Behavioral disruption	90 dB re: 20 µPa (harbor seals) / 100 dB re: 20 µPa (other pinnipeds) (unweighted)

* Impact pile driving produces impulsive noise; vibratory pile driving produces non-pulsed (continuous) noise.
** NMFS has not established any formal criteria for harassment resulting from exposure to airborne sound. However, these thresholds represent the best available information regarding the effects of pinniped exposure to such sound and NMFS' practice is to associate exposure at these levels with Level B harassment.

Distance to Sound Thresholds

Underwater Sound Propagation Formula – Pile driving generates underwater noise that can potentially result in disturbance to marine mammals in the project area. Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave

propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

$TL = B * \log_{10}(R_1/R_2)$, where

R_1 = the distance of the modeled SPL from the driven pile, and

R_2 = the distance from the driven pile of the initial measurement

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the water bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source (20*log(range)). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source (10*log(range)). A practical spreading value of fifteen is often used under conditions, such as Dutch Harbor, where water depth increases as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions. Practical spreading loss (4.5 dB reduction in sound level for each doubling of distance) is assumed here.

Underwater Sound – During the installation of piles, the project has the potential to increase underwater noise levels. This could result in disturbance to pinnipeds and cetaceans that occur within the Level B harassment zone. The intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity occurs. A large quantity of literature regarding SPLs recorded from pile driving projects is available for consideration. In order to determine reasonable SPLs and their associated effects on marine mammals that are likely to result from pile driving at the UMC dock, studies with similar properties to the specified activity were evaluated. See Section 5 of the COU's application for a detailed description of the information considered in determining reasonable proxy source level values.

According to studies by the California Department of Transportation (Caltrans), the installation of steel sheet piles using a vibratory hammer can result in underwater noise levels reaching a source level of 163 dB RMS or 162 dB_{SEL} at 10 m (Caltrans, 2015). PND Engineers, Inc. performed acoustic measurements during vibratory installation of steel sheet pile at a similar construction project in Unalaska, Alaska, and found average SPLs of 160.7 dB_{RMS} (Unisea, 2015). This lower value was used to calculate the harassment radii for vibratory installation sheet pile and is discussed further in Appendix A of the application.

Underwater noise levels during the vibratory removal and installation of 18-inch steel pile can reach a source level of 158 dB RMS or 158 dB_{SEL} at 10 m (Caltrans, 2015). Because there was little information on the underwater noise levels of the removal of

timber piles, the levels used for analysis (162 dB RMS at 10 m) were taken from the installation of timber piles (Caltrans, 2015). Underwater noise levels during the impact pile driving of a 30-inch steel pile can reach a source level of 185 dB RMS (172 dB_{SEL}, 196 dB_{pk}) at 10 m, whereas the underwater noise from the vibratory driving of 30-inch steel pile can result in a source level of 159 dB RMS (159 dB_{SEL}) at 10 m (Caltrans, 2015).

Dutch Harbor does not represent open water, or free field, conditions. Therefore, sounds would attenuate as they encounter land masses. As a result, and as described above, pile driving noise in the project area is not expected to propagate to the calculated distances for the 120 dB thresholds as shown in Table 7. See Appendix B of the application for figures depicting the actual extents of areas in which each underwater sound threshold is predicted to occur at the project area due to pile driving, taking into account the attenuation provided by landmasses.

Table 7. Modeled distances to the NMFS Level B harassment thresholds (isopleths) and actual monitoring zones during pile installation and removal.

Threshold	Distance (meters) *	Monitoring Zone
Impact driving, disturbance (160 dB)	464	500
Vibratory removal, disturbance (120 dB)	5,168**	3,300

*Distances shown are modeled maximum distances and do not account for landmasses which are expected to reduce the actual distances to sound thresholds.
**This is the maximum distance modeled. See Section 5 of the application for the modeled distances for each pile driving activity type.

Airborne Sound – During the installation of piles and blasting activities at the quarry, the project has the potential to increase airborne noise levels. This could result in

disturbance to pinnipeds at the surface of the water or hauled out along the shoreline of Iliuliuk Bay or the Dutch Harbor spit; however, we do not expect animals to haul out frequently within Dutch Harbor or the spit due to the amount of activity within the area. A spherical spreading loss model (*i.e.*, 6 dB reduction in sound level for each doubling of distance from the source), in which there is a perfectly unobstructed (free-field) environment not limited by depth or water surface, is appropriate for use with airborne sound and was used to estimate the distance to the airborne thresholds.

The formula for calculating spherical spreading loss in airborne noise is:

$$TL = GL \times \log(R_1/R_2)$$

where:

TL = Transmission loss (dB)

GL = Geometric Loss Coefficient (20 for spherical spreading in airborne noise)

R_1 = Range of the sound pressure level (m)

R_2 = Distance from the source of the initial measurement (m)

Noise levels used to calculate airborne harassment radii come from Laughlin (2010) and Laughlin (2013) and are summarized in Table 9 of the application. Data for vibratory driving from Laughlin (2010) is presented in dB_{L5EQ}, or the 5-minute average continuous sound level. In this case dB_{RMS} values would be calculated in a similar fashion, so these dB_{L5EQ} were considered equivalent to the standard dB_{RMS}. Impact pile driving noise levels were taken from a recent Washington State Department of

Transportation IHA application which used data collected by Laughlin (2013). A report was not available for this data, but it is assumed to be provided in dB_{RMS}. Only A-weighted airborne noise levels were available for quarry plasting (Giroux, 2009), so a conservative maximum level was selected, dBA_{LMAX}.

Based on the spherical spreading loss equation, the calculated airborne Level B harassment zones would extend out to the following distances:

- For the vibratory installation of 18-inch steel piles, the calculated airborne Level B harassment zone for harbor seals is 11.4 m; for Steller sea lions, the distance is 3.6 m;
- For the vibratory installation of 30-inch steel piles, the calculated airborne Level B harassment zone for harbor seals is 31.9 meters; for Steller sea lions, the distance is 10.1 m;
- For the impact installation of 24-inch steel piles, the calculated airborne Level B harassment zone for harbor seals is 152.4 m; for Steller sea lions, the distance is 48.2 m; and
- For quarry blasting, the calculated Level B harassment zone for harbor seals extends to 38.5 m and 12.2 m for Steller sea lions.

Vibratory installation of sheet piles is assumed to create lower noise levels than installation of 30-inch round piles, so these values will be used for sheet pile driving. Similarly, vibratory removal of steel or wooden piles will observe the same harassment radii. For the purposes of this analysis, impact installation of 30-inch steel piles is

assumed to generate similar sound levels to the installation of 24-inch piles, as no unweighted data was available for the 30-inch piles.

Since the in-water area encompassed within the above areas is located entirely within the underwater Level B harassment zone, the pinnipeds that come within these areas will already be recorded as a take based on Level B harassment threshold for underwater noise, which are in all cases larger than those associated with airborne sound. Further, it is not anticipated that any pinnipeds will haul out within the airborne harassment zone. Airborne noise thresholds have not been established for cetaceans (NOAA, 2015b), and no adverse impacts are anticipated.

Distance from the quarry bottom to the shoreline is an average of 70 - 80 m, so exposure to even Level B harassment from blasting noise is highly unlikely.

Therefore, we do not believe that authorization of incidental take resulting from airborne sound for pinnipeds is warranted, and airborne sound is not discussed further here.

Marine Mammal Occurrence

The most appropriate information available was used to estimate the number of potential incidences of take. Density estimates for Steller sea lions, harbor seals, humpback whales, and killer whales in Dutch Harbor, and more broadly in the waters surrounding Unalaska Island, are not readily available. Likewise, we were not able to find any published literature or reports describing densities or estimating abundance of either species in the project area. As such, data collected from marine mammal surveys

represent the best available information on the occurrence of both species in the project area.

Beginning in April 2015, UMC personnel began conducting surveys within Dutch Harbor under the direction of an ecological consultant. The consultant visited the site every month to ensure that data was gathered consistently and comprehensively. Observers monitored for a variety of marine mammals, including Steller sea lions, whales, and harbor seals. Several observation locations from various vantage points were selected for the surveys. Observations took place for approximately 15 minutes from each point, and included only marine mammals which were inside Dutch Harbor. The survey recorded the type of species observed, the number of species observed, the primary activity of the species, and any applicable notes. Surveys were conducted through July 2016.

These surveys represent the most recent data on marine mammal occurrence in the harbor, and represent the only targeted marine mammal surveys of the project area that we are aware of.

Data from bird surveys of Dutch Harbor conducted by the U.S. Army Corps of Engineers (USACE) from 2003-2013, which included observations of Steller sea lions in the harbor, were also available; however, we determined that these data were unreliable as a basis for prediction of marine mammal abundance in the project location as the goal of the USACE surveys was to develop a snapshot of waterfowl and seabird location and abundance in the harbor, thus the surveys would have been designed and carried out differently if the goal had been to document marine mammal use of the

harbor. Additionally, USACE surveys occurred only in winter; as Steller sea lion abundance is expected to vary significantly between the breeding and the non-breeding season in the project location, data that were collected only during the non-breeding season have limited utility in predicting year-round abundance. As such, we determined that the data from the surveys commissioned by COA in 2015-2016 represents the best available information on marine mammals in the project location.

Description of Take Calculation

The take calculations presented here rely on the best data currently available for marine mammal populations in the project location. Density data for marine mammal species in the project location is not available. Therefore the data collected from marine mammal surveys of Dutch Harbor in 2015-2016 represent the best available information on marine mammal populations in the project location, and this data was used to estimate take. As such, the zones that have been calculated to contain the areas ensonified to the Level A and Level B thresholds for pinnipeds have been calculated for mitigation and monitoring purposes and were not used in the calculation of take. See Table 8 for total estimated incidents of take. Estimates were based on the following assumptions:

- All marine mammals estimated to be in areas ensonified by noise exceeding the Level B harassment threshold for impact and vibratory driving (as shown in Appendix B of the application) are assumed to be in the water 100 percent of the time. This assumption is based on the fact that there are no haulouts or rookeries within the area predicted to be ensonified to the Level B harassment threshold based on modeling.

- Predicted exposures were based on total estimated total duration of pile driving/removal hours, which are estimated at 1,470 hours over the entire project. This estimate is based on a 245 day project time frame, an average work day of 12 hours, and a conservative estimate that up to approximately 50 percent of time (likely less on some days, based on the short pile driving durations provided in Table 5) during those work days will include pile driving and removal activities (with the rest of the work day spent on non-pile driving activities which will not result in marine mammal take, such as installing templating and bracing, moving equipment, etc.).
- Vibratory or impact driving could occur at any time during the "duration" and our approach to take calculation assumes a rate of occurrence that is the same for any of the calculated zones.
- The hourly marine mammal observation rate recorded during marine mammal surveys of Dutch Harbor in 2015 is reflective of the hourly rate that will be observed during the construction project.
- Takes were calculated based on estimated rates of occurrence for each species in the project area and this rate was assumed to be the same regardless of the size of the zone (for impact or vibratory driving/removal).
- Activities that may be accomplished by either impact driving or down-the-hole drilling (*i.e.,* fender support/pin piles, miscellaneous support piles, and temporary support piles) were assumed to be accomplished via impact driving. If any of these activities are ultimately accomplished via down-the-hole drilling instead of impact driving, this would not result in a change in the amount of overall effort (as they will be accomplished via down-the-hole drilling instead of, and not in addition to, impact driving). As take estimates are calculated based on effort and not marine mammal densities, this would not change the take estimate.

Take estimates for Steller sea lions, harbor seals, humpback whales, and killer whales were calculated using the following series of steps:

1. The average hourly rate of animals observed during 2015-2016 marine mammal surveys of Dutch Harbor was calculated separately for both species ("Observation Rate"). Thus "Observation Rate" (OR) = Number of individuals observed/hours of observation;
2. The 95 percent confidence interval was calculated for the data set, and the upper bound of the 95 percent confidence interval was added to the Observation Rate to account for variability of the small data set ("Exposure Rate"). Thus "Exposure Rate" (XR) = μ_{OR} + CI_{95} (where μ_{OR} = average of hourly observation rates and CI_{95} = 95 percent confidence interval (normal distribution);
3. The total estimated hours of pile driving work over the entire project was calculated, as described above ("Duration"); Thus "Duration" = total number of work days (245) * average pile driving/removal hours per day (6) = total work hours for the project (1,470); and
4. The estimated number of exposures was calculated by multiplying the "Duration" by the estimated "Exposure Rate" for each species. Thus, estimated takes = Duration * XR.

Please refer to Appendix G of the application for a more thorough description of the statistical analysis of the observation data from marine mammal surveys.

Steller Sea Lion – Steller sea lion density data for the project area is not available. Steller sea lions occur year-round in the Aleutian Islands and within Unalaska Bay and Dutch Harbor. As described above, local abundance in the non-breeding season (winter months) is generally lower overall; data from surveys conducted by the COU in 2015-2016 revealed Steller sea lions were present in Dutch Harbor in most months that surveys

occurred. We assume, based on marine mammal surveys of Dutch Harbor, and based on the best available information on seasonal abundance patterns of the species including over 20 years of NOAA National Marine Mammal Laboratory (NMML) survey data collected in Unalaska, that Steller sea lions will be regularly observed in the project area during most or all months of construction. As described above, all Steller sea lions in the project area at a given time are assumed to be in the water, thus any sea lion within the modeled area of ensonification exceeding the Level B harassment threshold would be recorded as taken by Level B harassment.

Estimated take of Steller sea lions was calculated using the equations described above, as follows:

μ_{OR} = 0.40 animals/hour

CI_{95} = 0.23 animals/hour

XR = 0.63 animals/hour

Estimated exposures (Level B harassment) = 0.63 * 1,470 = 926

Thus we estimate that a total of 926 Steller sea lion takes will occur as a result of the proposed UMC dock construction project (Table 8).

Harbor Seal – Harbor seal density data for the project location is not available. We assume, based on the best on the best available information, that harbor seals will be encountered in low numbers throughout the duration of the project. We relied on the best available information to estimate take of harbor seals, which in this case was survey data collected from the 2015-2016 marine mammal surveys of Dutch Harbor as described above. That survey data showed harbor seals are present in the harbor only occasionally

(average monthly observation rate = 0.41). NMML surveys have not been performed in Dutch Harbor, but the most recent NMML surveys of Unalaska Bay confirm that harbor seals are present in the area in relatively small numbers, with the most recent haulout counts in Unalaska Bay (2008-2011) recording no more than 19 individuals at the three known haulouts there. NMML surveys have been limited to the months of July and August, so it is not known whether harbor seal abundance in the project area varies seasonally. As described above, all harbor seals in the project area at a given time are assumed to be in the water, thus any harbor seals within the modeled area of ensonification exceeding the Level B harassment threshold would be recorded as taken by Level B harassment.

Estimated take of harbor seals was calculated using the equations described above, as follows:

μ_{OR} = 0.16 animals/hour

CI_{95} = 0.16 animals/hour

XR = 0.32 animals/hour

Estimated exposures (Level B harassment) = 0.32 * 1,470 hours = 470

Thus we estimate that a total of 470 harbor seal takes will occur as a result of the proposed UMC dock construction project (Table 8).

Humpback Whale – Humpback whale density data for the project location is not available. We assume, based on the best on the best available information, that humpback whales will be encountered in low numbers throughout the duration of the project. We relied on the best available information to estimate take of humpback whales, which in

this case was survey data collected from the 2015-2016 marine mammal surveys of Dutch Harbor as described above. That survey data showed humpback whales are present in the harbor only occasionally (average monthly observation rate = 0.06). Estimated take of humpback whales was calculated using the equations described above, as follows:

μ_{OR} = 0.06 animals/hour

CI_{95} = 0.06 animals/hour

XR = 0.12 animals/hour

Estimated exposures (Level B harassment) = 0.12 * 1,470 hours = 176

Thus we estimate that a total of 176 humpback whale takes will occur as a result of the proposed UMC dock construction project (Table 8).

Killer Whale - Little is known about killer whales that inhabit waters near Unalaska (Parsons *et al*., 2013). While it is likely that killer whales may appear in Dutch Harbor, given their known range and the availability of food, the 2015-2016 surveys saw only a small number (2) of marine mammals that were suspected to be killer whales (average monthly observation rate for these unidentified whales = 0.02). There are differences in the physical appearance of transient and resident killer whales; however, in the surveys no distinction was notated. Killer whale density data for the project location is not available. We assume, based on the best on the best available information, that killer whales will be encountered in low numbers throughout the duration of the project. We relied on the best available information to estimate take of killer whales, which in this case was survey data collected from the 2015-2016 marine mammal surveys of Dutch Harbor as described above. That survey data showed killer whales are potentially present

in the harbor only very rarely. Estimated take of killer whales was calculated using the equations described above, as follows:

μ_{OR} = 0.02 animals/hour

CI_{95} = 0.04 animals/hour

XR = 0.06 animals/hour

Estimated exposures (Level B harassment) = 0.06 * 1,470 hours = 88

Thus we estimate that a total of 81 killer whale takes will occur as a result of the proposed UMC dock construction project (Table 8).

We therefore propose to authorize the take, by Level B harassment only, of a total of 926 Steller sea lions (Western DPS), 470 harbor seals (Aleutian Islands Stock), 88 killer whales (Eastern North Pacific Alaska Resident and Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stocks), and 176 humpback whales (Central North Pacific Stock; Western North Pacific Stock) as a result of the proposed construction project. These take estimates are considered reasonable estimates of the number of marine mammal exposures to sound above the Level B harassment threshold that are likely to occur over the course of the project, and not the number of individual animals exposed. For instance, for pinnipeds that associate fishing boats in Dutch Harbor with reliable sources of food, there will almost certainly be some overlap in individuals present day-to-day depending on the number of vessels entering the harbor, however each instance of exposure for these individuals will be recorded as a separate, additional take. Moreover, because we anticipate that marine mammal observers will typically be unable to determine from field observations whether the same or different individuals are being

exposed over the course of a workday, each observation of a marine mammal will be recorded as a new take, although an individual theoretically would only be considered as taken once in a given day.

Table 8. Number of potential marine mammal incidental takes proposed for authorization, and percentage of stock abundance, as a result of the proposed project.

Species	Underwater[1]		Percentage of stock abundance
	Level A	Level B	
Humpback whale	0	176	1.6%
Killer whale	0	88	3.0%
Steller sea lion	0	926	1.9%
Harbor seal	0	470	8.1%

[1] We assume, for reasons described earlier, that no takes would occur as a result of airborne noise.

Analyses and Preliminary Determinations

Negligible Impact Analysis

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of Level B harassment takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through behavioral harassment, we consider other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location,

migration), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, and effects on habitat.

To avoid repetition, the discussion of our analyses applies generally to all the species listed in Table 8, given that the anticipated effects of this pile driving project on marine mammals are expected to be relatively similar in nature. Where there are species-specific factors that have been considered, they are identified below.

Pile driving activities associated with the proposed dock construction project, as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the specified activities may result in take, in the form of Level B harassment (behavioral disturbance) only, from underwater sounds generated from pile driving. Potential takes could occur if individuals of these species are present in the ensonified zone when pile driving and removal are under way.

The takes from Level B harassment will be due to potential behavioral disturbance and TTS. No serious injury or mortality of marine mammals would be anticipated as a result of vibratory and impact pile driving. Except when operated at long continuous duration (not the case here) in the presence of marine mammals that do not move away, vibratory hammers do not have significant potential to cause injury to marine mammals due to the relatively low source levels produced and the lack of potentially injurious source characteristics. Impact pile driving produces short, sharp pulses with higher peak levels than vibratory driving and much sharper rise time to reach those peaks. The potential for injury that may otherwise result from exposure to noise associated with impact pile driving will effectively be minimized through the implementation of the

planned mitigation measures. These measures include: the implementation of an exclusion (shutdown) zone, which is expected to eliminate the likelihood of marine mammal exposure to noise at received levels that could result in injury; and the use of "soft start" before pile driving, which is expected to provide marine mammals near or within the zone of potential injury with sufficient time to vacate the area. We believe the required mitigation measures, which have been successfully implemented in similar pile driving projects, will minimize the possibility of injury that may otherwise exist as a result of impact pile driving.

The proposed activities are localized and of relatively short duration. The entire project area is limited to the UMC Dock area and its immediate surroundings. These localized and short-term noise exposures may cause short-term behavioral modifications in harbor seals, Steller sea lions, killer whales, and humpback whales. Moreover, the proposed mitigation and monitoring measures, including injury shutdowns, soft start techniques, and multiple MMOs monitoring the behavioral and injury zones for marine mammal presence, are expected to reduce the likelihood of injury and behavior exposures. Additionally, no critical habitat for marine mammals are known to be within the ensonification areas of the proposed action area during the construction time frame. No pinniped rookeries or haul-outs are present within the project area

The project also is not expected to have significant adverse effects on affected marine mammals' habitat. The project activities would not modify existing marine mammal habitat for a significant amount of time. The activities may cause some fish to leave the area of disturbance, thus temporarily impacting marine mammals' foraging

opportunities in a limited portion of the foraging range; but, because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences.

Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from similar pile driving projects that have received incidental take authorizations from NMFS, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging. Most likely, individuals will simply move away from the sound source and be temporarily displaced from the area of pile driving (though even this reaction has been observed primarily in association with impact pile driving). In response to vibratory driving, harbor seals have been observed to orient towards and sometimes move towards the sound. Repeated exposures of individuals to levels of sound that may cause Level B harassment are unlikely to result in hearing impairment or to significantly disrupt foraging behavior. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in fitness to those individuals, and thus would not result in any adverse impact to the stock as a whole. Take of marine mammal species or stocks and their habitat will be reduced to the level of least practicable impact through use of mitigation measures described herein and, if sound produced by project activities is sufficiently disturbing, animals are likely to simply avoid the project area while the activity is occurring.

While we are not aware of comparable construction projects in the project location, the pile driving activities analyzed here are similar to other in-water construction activities that have received incidental harassment authorizations previously, including a Unisea dock construction project in neighboring Iliuliuk Harbor, and at Naval Base Kitsap Bangor in Hood Canal, Washington, and at the Port of Friday Harbor in the San Juan Islands, which have occurred with no reported injuries or mortalities to marine mammals, and no known long-term adverse consequences to marine mammals from behavioral harassment.

In summary, this negligible impact analysis is founded on the following factors: (1) the possibility of injury, serious injury, or mortality may reasonably be considered discountable; (2) the anticipated incidences of Level B harassment consist of, at worst, temporary modifications in behavior or potential TTS; (3) the absence of any major rookeries and only a few isolated haulout areas near the project site; (4) the absence of any other known areas or features of special significance for foraging or reproduction within the project area; and (5) the presumed efficacy of planned mitigation measures in reducing the effects of the specified activity to the level of least practicable impact. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activity will have only short-term effects on individual animals. The specified activity is not expected to impact rates of recruitment or survival and will therefore not result in population-level impacts.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, we preliminarily find that the total marine mammal take from UMC dock construction activities in Dutch Harbor will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers Analysis

The numbers of animals authorized to be taken would be considered small relative to the relevant stocks or populations (1.9 percent for Steller sea lions, 8.1 percent for harbor seals, 1.6 percent for humpback whales, and 3.0 percent for killer whales) even if each estimated taking occurred to a new individual. However, the likelihood that each take would occur to a new individual is extremely low.

Further, these takes are likely to occur only within some small portion of the overall regional stock. For example, of the estimated 49,497 western DPS Steller sea lions throughout Alaska, there are probably no more than 300 individuals with site fidelity to the three haulouts located nearest to the project location, based on over twenty years of NMML survey data (see "Description of Marine Mammals in the Area of the Specified Activity" above). For harbor seals, NMML survey data suggest there are likely no more than 60 individuals that use the three haulouts nearest to the project location (the only haulouts in Unalaska Bay). Thus the estimate of take is an estimate of the number of anticipated exposures, rather than an estimate of the number of individuals that will be taken, as we expect the majority of exposures would be repeat exposures that would

accrue to the same individuals. As such, the authorized takes would represent a much smaller number of individuals in relation to total stock sizes.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, we preliminarily find that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

Subsistence hunting and fishing is an important part of the history and culture of Unalaska Island. However, the number of Steller sea lions and harbor seals harvested in Unalaska decreased from 1994 through 2008; in 2008, the last year for which data is available, there were no harbor seals reported as harvested for subsistence use and only three Steller sea lions reported (Wolfe *et al*., 2009). Data on pinnipeds hunted for subsistence use in Unalaska has not been collected since 2008. For a summary of data on pinniped harvests in Unalaska from 1994-2008, see Section 8 of the application. Subsistence hunting for humpback whales and killer whales does not occur in Unalaska.

Aside from the apparently decreasing rate of subsistence hunting in Unalaska, Dutch Harbor is not likely to be used for subsistence hunting or fishing due to its industrial nature, with several dock facilities located along the shoreline of the harbor. In addition, the proposed construction project is likely to result only in short-term, temporary impacts to pinnipeds in the form of possible behavior changes, and is not expected to result in the injury or death of any marine mammal. As such, the proposed

project is not likely to adversely impact the availability of any marine mammal species or stocks that may otherwise be used for subsistence purposes.

Endangered Species Act (ESA)

Threatened or endangered marine mammal species with confirmed occurrence in the project area include the Western North Pacific DPS and Mexico DPS of humpback whale, and the Western DPS Steller sea lion. The project area occurs within critical habitat for three major Steller sea lion haul-outs and one rookery. The three haul-outs (Old Man Rocks, Unalaska/Cape Sedanka, and Akutan/Reef-Lava) are located between approximately 15 and 19 nautical miles from the project area. The closest rookery is Akutan/Cape Morgan, which is about 19 nautical miles from the project area. The NMFS Permits and Conservation Division has initiated consultation with the NMFS Alaska Regional Office Protected Resources Division under section 7 of the ESA on the issuance of an IHA to the COU under section 101(a)(5)(D) of the MMPA for this activity. Consultation will be concluded prior to a determination on the issuance of an IHA.

Proposed Authorization

As a result of these preliminary determinations, we propose to issue an IHA to the COU, to conduct the described dock construction activities in Dutch Harbor, from March 1, 2016 through February 28, 2017, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. The proposed IHA language is provided next.

This section contains a draft of the IHA itself. The wording contained in this section is proposed for inclusion in the IHA (if issued).

1. This Incidental Harassment Authorization (IHA) is valid from March 1, 2016 through February 28, 2017.

2. This IHA is valid only for pile driving and removal activities associated with construction of the UMC dock in Dutch Harbor, Unalaska, Alaska.

3. General Conditions

(a) A copy of this IHA must be in the possession of the COU, its designees, and work crew personnel operating under the authority of this IHA.

(b) The species authorized for taking are the harbor seal (*Phoca vitulina*), Steller sea lion (*Eumetopias jubatus*), humpback whale (*Megaptera novaeangliae*), and killer whale (*Orcinus orca*).

(c) The taking, by Level B harassment only, is limited to the species listed in condition 3(b). See Table 8 in the proposed IHA authorization for numbers of take authorized.

(d) The taking by injury (Level A harassment), serious injury, or death of any of the species listed in condition 3(b) of the Authorization or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA.

(e) The COU shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, and the COU personnel prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

4. Mitigation Measures

The holder of this Authorization is required to implement the following mitigation measures:

(a) For all pile driving activities, the COU shall establish an exclusion (shutdown) zone intended to contain the area in which Level A harassment thresholds are exceeded.

(b) The established shutdown zones corresponding to the Level A harassment zones for each activity are as follows:

i. For all vibratory pile driving activities, a 10-m radius shutdown zone shall be employed

ii. During impact pile driving, a shutdown zone shall be determined by the number of piles to be driven that day as follows: If the maximum of five piles are to be driven that day, shutdown during the first driven pile shall occur if a marine mammal enters the '5-pile' radius. After the first pile is driven, if no marine mammals have been observed within the '5-pile'radius, the '4-pile' radius shall become the shutdown radius. This pattern shall continue unless an animal is observed within the most recent shutdown radius, at which time that shutdown radius shall remain in effect for the rest of the workday. Shutdown radii for each species, depending on number of piles driven, are as follows:

- 5-pile radius: humpback whale, 185 m; killer whale, 10 m; harbor seal, 100 m; Steller sea lion, 10 m
- 4-pile radius: humpback whale, 160 m; killer whale, 10 m; harbor seal, 85 m; Steller sea lion, 10 m
- 3-pile radius: humpback whale, 135 m; killer whale, 10 m; harbor seal, 70 m; Steller sea lion, 10 m
- 2-pile radius: humpback whale, 100 m; killer whale, 10 m; harbor seal, 55 m; Steller sea lion, 10 m
- 1-pile radius: humpback whale, 65 m; killer whale, 10 m; harbor seal, 35 m; Steller sea lion, 10 m

(c) A shutdown shall occur prior to a marine mammal entering a shutdown zone appropriate for that species and the concurrent work activity. Activity shall cease until the observer is confident that the animal is clear of the shutdown zone: The animal shall be considered clear if:

- It has been observed leaving the shutdown zone; or
- It has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.

(d) If shutdown lasts for more than 30 minutes, pre-activity monitoring (see below) must recommence.

(e) Prior to the start of daily in-water construction activity, or whenever a break in pile driving of 30 minutes or longer occurs, the observer shall observe the shutdown and monitoring zones for a period of 30 minutes. The shutdown zone shall be

cleared when a marine mammal has not been observed within zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start (described below) cannot proceed until the marine mammal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans). If the Level B harassment zone has been observed for 30 minutes and non-permitted species are not present within the zone, soft start procedures can commence and work can continue even if visibility becomes impaired within the Level B zone. If the Level B zone is not visible while work continues, exposures shall be recorded at the estimated exposure rate for each permitted species. If work ceases for more than 30 minutes, the pre-activity monitoring of both zones must recommence

(f) If the exclusion zone is obscured by fog or poor lighting conditions, pile driving shall not be initiated until the exclusion zone is clearly visible. Should such conditions arise while impact driving is underway, the activity would be halted.

(g) Soft start procedures shall be used prior to pile removal, pile installation, and in-water fill placement to allow marine mammals to leave the area prior to exposure to maximum noise levels. For vibratory hammers, the soft start technique shall initiate noise from the hammer for short periods at a reduced energy level, followed by a brief waiting period and repeating the procedure two additional times. For impact hammers, the soft start technique shall initiate several strikes at a reduced energy level, followed by a brief waiting period. This procedure shall also be repeated two additional times. Equipment used for fill placement shall be idled near the waterside edge of the fill area for 15 minutes prior to performing in-water fill placement

(h) During in-water or over-water construction activities having the potential to affect marine mammals, but not involving a pile driver, a shutdown zone of 10 m shall be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the removal of the pile from the water column/substrate via a crane ("deadpull"), or the slinging of construction materials via crane.

(i) To minimize impacts from vessels interactions with marine mammals, the crews aboard project vessels shall follow NMFS's marine mammal viewing guidelines and regulations as practicable.

(*https://alaskafisheries.noaa.gov/protectedresources/mmv/guide.htm*).

5. Monitoring

The holder of this Authorization is required to conduct marine mammal monitoring during pile driving activity. The COU shall collect sighting data and shall record behavioral responses to construction activities for marine mammal species observed in the project location during the period of activity. All marine mammal observers (MMOs) shall be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring. The COU shall monitor the exclusion zones (shutdown zones) and Level B harassment zones before, during, and after pile driving, with observers located at the best practicable vantage points. The Marine Mammal Monitoring Plan shall implement the following procedures for pile driving:

(a) During observation periods, observers shall continuously scan the area for marine mammals using binoculars and the naked eye. Observers shall work shifts of a maximum of four consecutive hours followed by an observer rotation or a 1-hour break and shall work no more than 12 hours in any 24-hour period. Observers shall collect data including, but not limited to, environmental conditions (*e.g.*, sea state, precipitation, glare, etc.), marine mammal sightings (*e.g.*, species, numbers, location, behavior, responses to construction activity, etc.), construction activity at the time of sighting, and number of marine mammal exposures. Observers shall conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this IHA

(b) During all observation periods, observers shall use binoculars and the naked eye to search continuously for marine mammals.

(c) If marine mammals are observed within the monitoring zone (ZOI--500 m during impact pile driving; 3,300 m during vibratory pile driving) the sighting shall be documented as a potential Level B take and the animal behaviors shall be documented. If the number of marine mammals exposed to Level B harassment approaches the number of takes allowed by the IHA, the COU shall notify NMFS and seek further consultation. If any marine mammal species are encountered that are not authorized by the IHA and are likely to be exposed to sound pressure levels greater than or equal to the Level B harassment thresholds, then the COU shall shut down in-water activity to avoid take of those species.

(d) Observers shall implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, clearing of the zones, and shutdown procedures. They shall be in continuous contact with the construction personnel via two-way radio. A cellular phone shall be use as back-up communications and for safety purposes.

(e) Individuals implementing the monitoring protocol shall assess its effectiveness using an adaptive approach. MMOs shall use their best professional judgment throughout implementation and seek improvements to these methods when deemed appropriate. Any modifications to protocol shall be coordinated between NMFS and the COU.

(f) The following information shall be collected on marine mammal sighting forms:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (*e.g.* percent cloud cover, percent glare, visibility) and Beaufort sea state.
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;
- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile driving activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown; and
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

6. Reporting

The holder of this Authorization is required to:

(a) Submit a draft report within 90 calendar days of the completion of the activity, The report shall include information on marine mammal observations pre-activity, during-activity, and post-activity during pile driving days, and shall provide descriptions of any behavioral responses to construction activities by marine mammals and a complete description of any mitigation shutdowns and results of those actions, as well as an estimate of total take based on the number of marine mammals observed during the course of construction. A final report shall be submitted within 30 days following resolution of comments from NMFS on the draft report. The report shall include at a minimum:

- General data:
    - Date and time of activity
    - Water conditions (*e.g.*, sea-state)
    - Weather conditions (*e.g.*, percent cover, percent glare, visibility)
    - Date and time of activity
    - Water conditions (*e.g.*, sea-state)
    - Weather conditions (*e.g.*, percent cover, percent glare, visibility)
- Specific pile driving data:
    - Description of the pile driving activity being conducted (pile locations, pile size and type), and times (onset and completion) when pile driving occurs.
    - The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that pile driving times and strike counts are accurately recorded. The duration of soft start procedures should be noted as separate from the full power driving duration.

- Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)

- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated
  - Description of any observable marine mammals and their behavior in the immediate area during monitoring
  - Times when pile driving or other in-water construction is delayed due to presence of marine mammals within shutdown zones.

- During-activity observational survey-specific data:
  - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
    - Distance from animal to pile driving sound source.
    - Reason why/why not shutdown implemented.
    - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
    - If a shutdown was implemented, the distance from animal to sound source at the time of the shutdown.
    - Behavioral reactions noted during soft starts and if they occurred before or after implementation of the soft start.
    - Distance to the animal from the sound source during soft start.

- Post-activity observational survey-specific data:
    - Results, which include the detections and behavioral reactions of marine mammals, the species and numbers observed, sighting rates and distances,
    - Refined exposure estimate based on the number of marine mammals observed. This may be reported as a rate of take (number of marine mammals per hour or per day), or using some other appropriate metric.

(b) Reporting injured or dead marine mammals:

i. In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner not authorized by the IHA (if issued), such as a Level A harassment, or a take of a marine mammal species other than those proposed for authorization, the COU would immediately cease the specified activities and immediately report the incident to Jolie Harrison (*Jolie.Harrison@noaa.gov*), Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and Aleria Jensen (*Aleria.Jensen@noaa.gov*), Alaska Stranding Coordinator.

The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);

- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with the COU to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The COU would not be able to resume their activities until notified by NMFS via letter, email, or telephone.

ii. In the event that the COU discovers an injured or dead marine mammal, and determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition), the COU would immediately report the incident to Jolie Harrison (*Jolie.Harrison@noaa.gov*), Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and Aleria Jensen (*Aleria.Jensen@noaa.gov*), Alaska Stranding Coordinator.

The report would include the same information identified in the paragraph above. Construction related activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would

work with the COU to determine whether modifications in the activities are appropriate.

iii. In the event that the COU discovers an injured or dead marine mammal, and determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the COU would report the incident to Jolie Harrison (*Jolie.Harrison@noaa.gov*), Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and Aleria Jensen (*Aleria.Jensen@noaa.gov*), Alaska Stranding Coordinator, within 24 hours of the discovery. The COU would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. The COU can continue its operations under such a case.

7. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein, or if NMFS determines that the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

Request for Public Comments

We request comment on our analysis, the draft authorization, and any other aspect of this Notice of Proposed IHA for the COU's dock construction activities. Please include

with your comments any supporting data or literature citations to help inform our final decision on the COU's request for an MMPA authorization.

Dated: November 4, 2016.

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Donna S. Wieting

Director, Office of Protected Resources,

National Marine Fisheries Service.

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